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Drone based contactless disinfectant spraying system - A safety COVID measures

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***Abstract*---**The recent pneumonia spread brought about by a novel corona virus (COVID-19) in china is representing an incredible risk and proclaimed a worldwide emergency of public health. It has spread to the world and infected people with COVID-19 disease. In addition to the absence of explicit treatment as well as vaccine, COVID-19 are currently known to reveal a noteworthy environmental resistance. The transmission of virus was found to be spread through human –to – human that make it easily diffused. The transmission comes from the droplets of infected when sneezing or coughing. These droplets can survive on the inanimate surface even in air and transmitted the virus to human. The aim of our project is to design and develop an antiseptic disinfection spraying system has ability to disinfect large scale area with less time consuming and minimal human interactions. The range of drone is 100m and speed 8m/s then flight time is 15 min. It additionally proposes detail of the range of antiseptic – disinfectant and denaturation that have been used in this operation. The term contactless has been strongly used post COVID keeping that in mind we develop a model which will carry the disinfectant spraying tank with drone for spraying which will be controlled through an android application. The advantage of the UAV can be fly at any altitude, offer high quality data's, by using sensors, algorithm.

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***Keywords*---**Coronavirus, COVID-19, disinfectant, spraying drone, antiseptic-disinfectant, denaturation.

Introduction

A new human corona virus which is presently called covid-19. this virus found on the initial case at china and begin to spread to the world. Commonly, infectedof covid-19 can suffer from fever or symptoms like shortness of breath, dry cough, sore throat, fatigue, myalgia, sputum production, arthralgia, headache, nasal congestion and haemoptysis. The transmission of virus was found to be spread through human to human that makes it easily diffused. The transmission came from the droplets of infectedwhen sneezing or coughing. These droplets can survive on the inanimate surface even in air (aerosol) and transmitted the virus to human. There are two types of droplet based on its size, the nuclei droplet. The nuclei droplet is the droplet that can remain in the air for some period of time due to its small size. The Airborne transmission occur through this droplet in the specific circumstance. Respiratory droplets can be transmitted to someone with close distance to infective through sneezing and coughing. The part of the body like eyes, nose, mouth that exposed to thisdroplet can allow the virus to enter the body. Theindirect transmission occurs through the inanimate surface where the droplets lay on it. Based on previous research on the endurance of the virus in inanimate surface and air (aerosol). The study suggests to remove the virus using biocides like hydrogen peroxide, sodiumhypochlorite, alcohol,or benzal sodium chloride. Disinfected surface using 0.1% sodium hypochlorite or 62-71% ethanol shows significant reduction of corona virus within one-minute exposure. The study claims it to be effectively against the corona virus. Absence of remedy, high mortality and transmission patterns of covid -19 include the development of robust and oriented means of prevention to halt the speed of this virus world-wide. to prevent this flaw, an alternative technology is needed with less human interaction to minimize the probability of virus spreading. A preliminary design of the solar-powered unmanned seaplane is carried out while its flight performance is analysed later. The conceptual design of a twin-tail boom with large aspect ratio wings and buoyancy system is put forward. The energy balance models of the proposed seaplane system are created for the periods that the seaplane moors on the sea to harvest solar energy and flies in the sky to perform the mission. The parameter effects, such as wing loading, take-off time, weight, cruise speed, take-off ground distance, take-off ground time, flight envelope, and endurance are discussed. In order to improve the detection and diagnosis system of COVID-19, recent studies, which have auto and fast detection ability of coronavirus based on the thermal image with little human intervention was developed by the current. This is to develop a user friendly interface for the farmer. the FREYER drone is a pesticide spraying quad copter for agricultural purpose which helps the farmer to spray pesticides all over his land so that it reduces work which can evenly spray all over his farm. Here the farmer can control the drone using an android app and he can connect to the app using Wi-Fi module (ESP 8266) which is interfaced in the drone.. The green house based modern agriculture industries are the recent requirement in every part of agriculture in India. In famous world, wireless technology should be used by 85% people. Nowadays, agriculture has not well in growth; many people are not properly protecting the agronomy. Because they have to spend more time to visit and maintain the growth of crops. For this purpose, they are using vehicles to visit the farm house. It is the main reason for the climate changing and environment pollution. Due to climate change, there is no proper raining in the growing period.Employed UAV fly on 3D Plane matching a distribution network while serving customer and ensuring collision avoidance among team members. the objective is getting a sequence of submission that ensures the delivery to customer satisfying the requested amount and demand within a given time horizon. The method propose in the paper offers solution to several question related to the multistage mission planning that could be applied to solve problems such as minimizing the energy consumption, conducting the mission in the shortest possible time, just-in-time replenishing of supplies and so on. Amilathibbotuwawa, GrzegorzBocewicz (2019).Thereading at the ground level were taken with prominently sensors and airborne data were acquired by flying a multispectral camera and a hyper spectral sensor 80 and 330m above ground level, respectively. The aerial imagery was used to calculate N nutritional status Jose l. Gabriel, Pablo j. Zarco-tejada(2017).The traditional methods which were used by the farmer were not sufficient enough to fulfil these requirements.thus, new automated methods are introduced.. This technology has protected the crop yield from various factors like the climate changes, population growth, employment issues and the food security problems in agriculture such as forTanhatalaviya,Dhara shah , Nivedita Patel…(2020).

Multi Rotor Drone

Multi ROTOR drone are the most common type of drones which are used by professional and hobbyists alike. They are used for most common applications like aerial video surveillance etc. Different types of products are available in this segment in the market (50 USD to 400USD). Out of all the 4 drone types (based on aerial platform), multi – rotor drones are the easiest to manufacture and they are the cheapest option available as well as.

Fig:1-Multi Rotor Drone

Fixed Wing Drone

The fixed Wing drones are different in design and build to multi rotor drones. They use a 'wing' like the normal airplanes out there. Unlike multi rotor drones, fixed Wing type models never utilize energy to stay afloat on air (fixed Wing types can't stand still on the air) fighting gravity. Instead, they move forward on their set course or as set by the guide control (possibly a remote unit operated by a human) as long as their energy source permits.

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Fig 2 Fixed Wing Drone

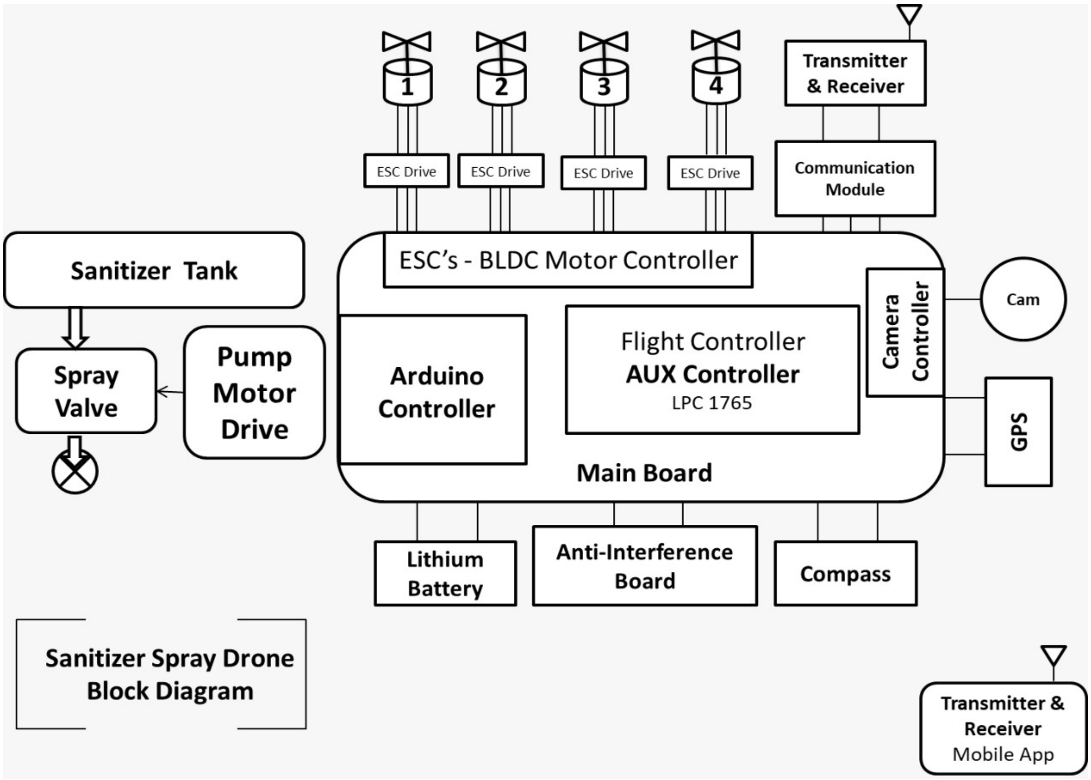
Single Rotor Drones

Single rotor drones look very similar in design & structure to actual helicopters. Unlike a multi rotor drone, a single rotor model has just one big sized rotor plus a small sized one on the tail of the drone its heading. Single rotor drones are much efficient than multi rotor versions. They have higher flying times and can even be powered by gas engines. In aerodynamics, the lower the count of rotors the lesser will be the spin of the object. In this VTOL and hover flight and long endurance (with gas power). In this heavier payload capability.

Methodology

In this study an antiseptic disinfection spraying UAV is developed that includeThe drone programming will be crucial in fulfilling the realization of truly autonomous drone.lets writes a basic drone kit python script that will command the drone into the air at some target altitude and then simply land. Again, this will all be form a python script. You can choose to either implement this on your SITL vehicle or an actual programmable drone.

Flow chart


1
2
3
4
Transmitter
& Receiver
ESC Drive
ESC Drive
ESC Drive
ESC Drive
Communication
Module
Sanitizer Tank
ESC's - BLDC Motor Controller
Camera
Controller
Cam
Spray
Valve
Pump
Motor
Drive
Arduino
Controller
Flight Controller
AUX Controller
LPC 1765
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Sanitizer Spray Drone
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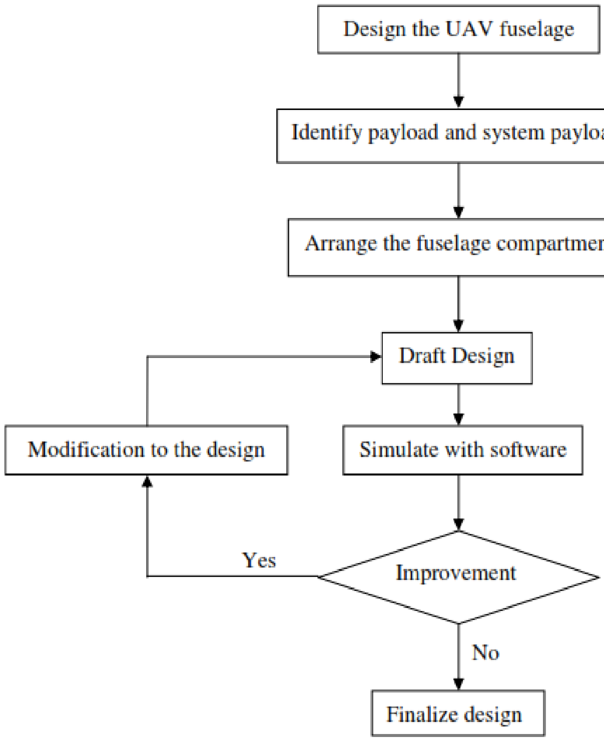


The use of drones for commercial purposes has received a lot of attention lately, as Amazon has announced plans to use UAVs to deliver packages to clienteles. It is a very interesting and transformative knowledge with many intended and unintended significances.

The future use of UAVs in healthcare is also very exciting. How can manufacturing use this technology to improve safety and the delivery of care? Healthy to start, UAVs have even now been tested to deliver food aid and medical supplies in zones affected by a catastrophe, pandemic, etc. Prompt delivery of vaccines, drugs, and supplies directly to the source could reverse deadly communicable disease outbreaks like the COVID-19 case today. Communication equipment, mobile technology, portable shelters make up the vast list of what could be delivered quickly in areas where critical damage to infrastructure would prevent typical land or air transportation also the contamination of dangerous diseases.

The references review is divided into two parts: the first concerns the different uses discussed in the references by the UAVs in different sectors (private, military, health, etc.). The second part rather looks at the different resolution approaches, namely exact methods, heuristics, metaheuristics, or hybrid methods inspired by different related disciplines. In our review of the references, we do not deal with the "systems control" aspect. It presents an introduction to the technical and material problems related to control. A survey of multi-hop networks of unmanned aerial and aquatic vehicles has been presented.

In has been studied driver performance due to small applications of unmanned aerial systems near roads. The authors claim that the post-experience questionnaire revealed that about 30% of the participants had seen a drone in flight near a road before this study.

Recently, give a state of the art on the use of drones in clinical microbiology and infectious diseases: current situation, challenges, and obstacles.13 The authors summarize current knowledge regarding the use of drones in healthcare, focusing on infectious diseases and/or microbiology. It provide a review of the reference on the potential applications integrating drones in smart cities, their implications, and the technical and non-technical problems faced by this integration. It also discusses the enabling regulations and technologies currently available and under development that can be used to support such integration.A simulation model (HERMES) has been proposed to make analyses for an evaluation objective of an Unmanned Aerial System (UAVs) for the distribution of vaccines for patients with different geographical dispersion taking into consideration the capacity of the drone and minimizing the associated costs of delivery compared to a traditional delivery system.

Fig 3: Sanitizing In Public Places

Environmental aspect

The environmental aspects of drones focus on the freight transport sector is one of the most polluting sectors, which causes global warming. According to surveys, it accounts for a fifth of global greenhouse gas emissions. The use of drones in this area may help reduce emissions, but the real reduction will only be possible under certain conditions. In recent years, drones have evolved a lot, technology has become increasingly efficient and usable in several areas. Despite all this development, drones are still characterized by technical constraints such as payload and limited autonomy, weather conditions which can be a significant problem for drones.

Social aspect

The social aspect of drones is that the rise of autonomous vehicles in the logistics sector has raised uncertainty about the impact that this technology could have on the workforce (Most sceptics believe that the use of autonomous vehicles will harm the labour market because automating the delivery process is equivalent to eliminating the tasks that are currently performed by a human being). Regarding the risks to the protection of privacy and personal data, you should know that drones are normally equipped with cameras allowing pilots to direct them. The recording by drones of images of people in their house or their garden can constitute an invasion of privacy and private pand their data.

Technical aspect

In recent years, drones have evolved a lot, technology has become increasingly efficient and usable in several areas. Despite all this development, drones are still characterized by technical constraints. First, the Payload and limited autonomy; unlike traditional delivery methods, such as vans or cars that can load up to around 300 packages and travel up to 500 km before the tank is empty, drones have more limited limits. Currently, drones can only carry a single package of reduced dimensions and weight. Second, weather conditions can be a significant problem for drones.roperty, as well as a violation of the rights of citizens in this matter.

Drones to real-time monitoring and information

The humanitarian community, however, the focus is more on features that would allow assessment and monitoring of large areas, in particular:

- Identify and monitor displaced populations, their movements, and temporary settlements.
- Carry out large-scale assessments of an affected region or assess remote and hard to reach areas
- Track logistics convoys in real-time.

These features would require medium to large drones and sophisticated data transmission technology. As an example, we can cite China, which uses pigeon drones to monitor the population in the presence of the coronavirus. These new drones mimic the action of a bird's wings to climb, dive, or spin in the air. They would be able to reproduce about 90% of the movements of a real pigeon. Besides, they produce very little noise, which makes them very difficult to detect from the ground, and are so realistic that real birds often fly alongside them, says the Hong Kong daily. Pigeon drones weigh only 200 g, have a wingspan of about 50 cm, and can fly at speeds of up to 40 km/h for up to 30 min.

Component Description
2300 Kv BLDC motor - 4no's:

It is Brushless **Motor** features unique cooling fins that draw up air from the **motor** base which passes through the **motor** coils. The faster it spins the more air it moves. This can reduce the temperature of the **motor** up to 30% which in turn increases the service life of this **BLDC Motor**.

Brushless DC motors (BLDC)

- Low maintenance
- High efficiency
- Complex control (DC to AC)

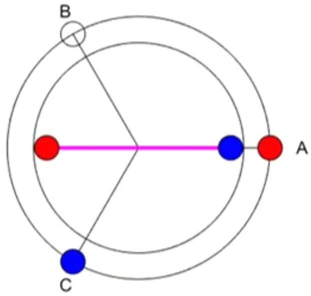


FIG 4: 2300Kv BLDC MOTOR

PROPELLER – 4No's:

Propellers are devices that transform rotary motion into linear thrust. Dronepropeller blades are most commonly constructed from plastic or carbon fibre. This accelerates a mass of air in one direction, providing lift which counteracts the force of gravity**.** Propeller speeds are varied by changing the voltage supplied to the propeller's motor.

FIG 5: Propeeler

Brushless DC motor:

Brushless DC electric motors (BLDC motors, BL motors. also known as electronically commutated motors (ECMs, EC motors) are synchronous motors that are powered by a DC electric source via an integrated inverter/switching power supply, which produces an AC electric signal to drive the motor. In this context, AC, alternating current, does not imply a sinusoidal waveform, but rather a bi-directional current with no restriction on waveform. Additional sensors and electronics control the inverter output amplitude and waveform (and therefore percent of DC bus usage/efficiency) and frequency (i.e., rotor speed).Efficiency is a primary selling feature for BLDC motors. Because the rotor is the sole bearer of the magnets, it requires no power, i.e., no connections, no commutates, and no brushes. In place of these, the motor employs control circuitry. To detect where the rotor is at certain times, BLDC motors employ, along with controllers, rotary encoders or a Hall sensor

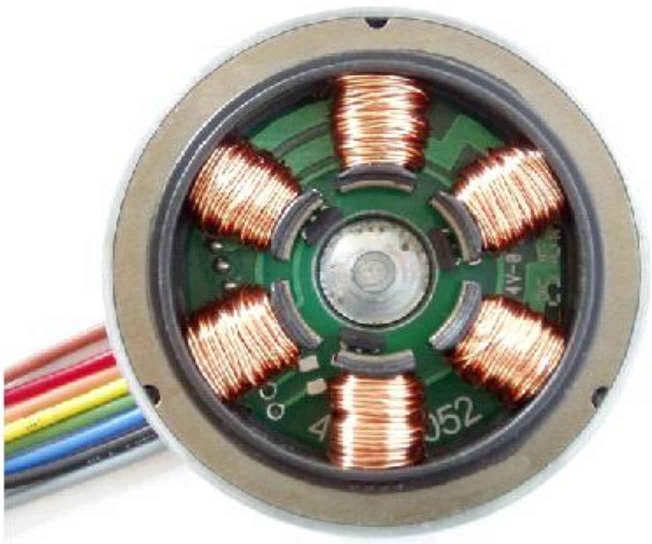


Figure 6. BLDC Motor

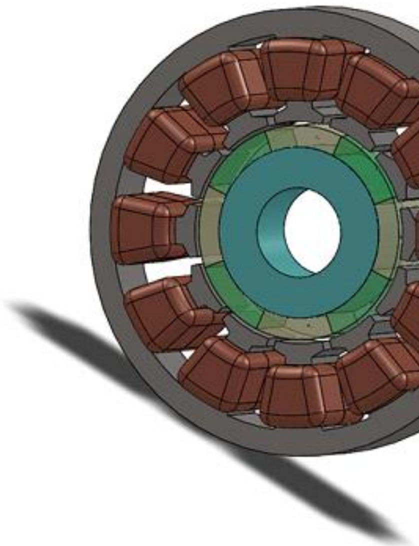
Application

Brushless DC motors (BLDC) are used for a wide variety of application requirements such as varying loads, constant loads and positioning applications in the fields of industrial control, automotive, aviation, automation systems, health care equipments, etc. Some specific applications of BLDC motors are:

- Computer hard drives and DVD/CD players
- Electric vehicles, hybrid vehicles, and electric bicycles

Description

The motor being considered here has a rotor containing 8 permanent magnets and a 12-coil stator as shown in Figure 2. The rotor is driven to turn by magnetic forces resulting from the excitation coils and the permanent magnets. By creating multiple studies, the user can change the materials, the number of turns, the current through each turn, and the geometry of each part. EMS allows the user to keep the same assembly file and associate each study with a design table. All these features are very helpful for designers and can be used to determine the Brushless DC motor parameters which must be changed in order to optimize the Motor performances.



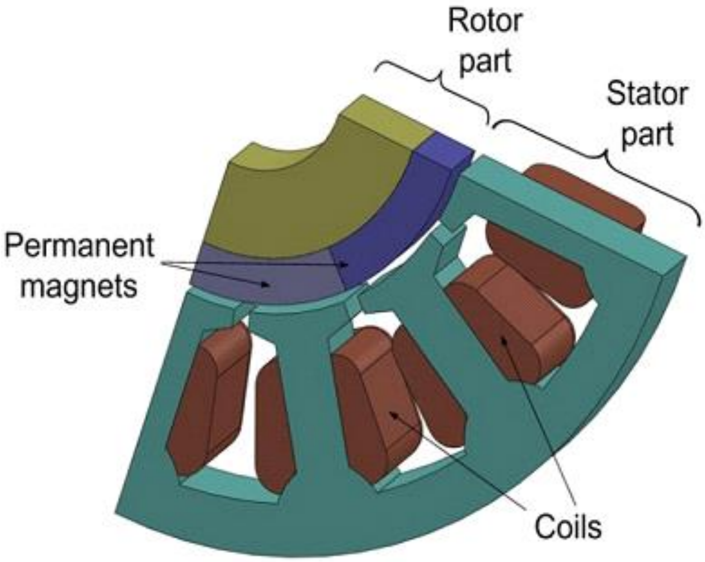


Figure 7. 3d model of BLDC

Propeller

Propellers are devices that transform rotary motion into linear thrust. Drone propellers provide lift for the aircraft by spinning and creating an airflow, which results in a pressure difference between the top and bottom surfaces of the propeller. This accelerates a mass of air in one direction, providing lift which counteracts the force of gravity.

Figure 8. UAVOS Drone Propeller Blades

Propellers for multirotor drones such as hex copter, octocopter and quadcopter propellers are arranged in pairs, spinning either clockwise or anti-clockwise to create a balance. Varying the speed of these propellers allows the drone to hover, ascend, descend, or affect its yaw, pitch and roll. Propeller speeds are varied by changing the voltage supplied to the propeller's motor, a process that is handled by an Electronic Speed Controller (ESC). The correct signal is fed to the ESC by the drone's flight controller, which relies on inputs from either the human pilot's controller or an autopilot, and may also take into account information from an IMU (Inertial Measurement System), GPS and other sensors.

UAV propeller dimensions and tradeoffs

Hybrid VTOL UAVs combine VTOL capability with the standard forward propulsion of a fixed wing UAV. In many hybrid VTOL UAVs, rotary lift propellers are typically incorporated into the aircraft's wings, which then transition for forward flight.

Figure 9. Custom Drone Propellers

Drone propeller manufacturers usually specify two main measurements, quoted in the form A x B. The first number is the total length of the propeller from end to end. The second is the pitch, which is related to the angle of the propeller and is defined as how far the propeller will move forward under ideal conditions for every rotation. This can be thought of in a similar way to how far a screw will sink into a surface for every rotation of the screwdriver. Shorter propellers require less energy to get up to a particular speed, and due to reduced inertia are easier to control and quicker to change speed. Longer propellers generate more lift for a particular RPM and create greater stability when hovering, but require more motor power. Propellers with higher pitch will provide more lift than a flatter blade and allow a drone to fly faster for a particular RPM, but will drain the drone battery faster due to requiring more power from the motor. Heavy-lift drones will typically require longer propellers with smaller pitch, as they require stability rather than speed, and will be able to carry larger batteries or power sources such as hydrogen fuel cells in order to offset the increased requirements.

Drone propeller construction

Drone propellers can be constructed with two, three, or four blades. Propellers with more blades provide greater lift due to more surface area moving through the air per rotation, but are more inefficient due to increased drag. Smaller drones with limited battery life are best suited to propellers with fewer blades. Drone propeller blades are most commonly constructed from plastic or carbon fiber.

Plastic propellers are cheaper and more flexible, allowing them to absorb impact better. The increased stiffness of carbon fiber propellers, although providing less durability, decreases vibration thus improving the flight performance of the drone and making it quieter. Carbon fiber is also lighter than plastic, allowing weight savings.

Factors to Consider When Selecting Drone Propeller Blades

In this article, KDE Direct explores the factors that should be considered when selecting VTOL/multirotor UAV propeller blades.

There are a number of factors that should be taken into consideration when choosing the right drone propeller blades. Drone propeller blades have a significant influence on power and can affect how smoothly a drone flies. Therefore, one of the most important considerations is flight efficiency – how will new drone propeller blades improve the flight efficiency of your multirotor UAV When selecting new drone propeller blades, the following factors are important:

Number & Size of Blades

The number of blades required per propeller will vary depending on the platform, usage and payload requirements. Smaller blades, under eight inches, are most frequently used for racing drones and those used for acrobatics. Smaller blades are generally paired with smaller motors with high kV ratings. Larger blades, over eight inches, are paired with motors that have low kV ratings and can be used to carry heavier payloads, such as video equipment or spraying containers for agriculture.

Pitch

Pitch is defined as the traveling distance per a single revolution of the propeller. The correct pitch will often depend on the specific application for a UAV platform. Lower pitch often results in more torque and less turbulence for lifting, and as a result the motors do not have to work as hard to carry heavy payloads which can result in increased flight time (as the motors will draw less current from the battery).Propellers with higher pitches move more air, but generally create more turbulence and less torque.

Diameter

Typically, a larger diameter propeller blade allows greater contact with the air. This relates directly to flight efficiency, as a small increase or decrease in diameter can change how efficiently a drone performs. Larger propellers tend to be more stable when hovering than smaller propellers. However, smaller propeller blades require less effort to speed up or slow down than larger ones, making them more responsive than larger propellers. Smaller propellers with a high pitch are better suited for fast and quick maneuvers, while larger propellers with low pitches are more appropriate for carrying heavier payloads and aerial video cameras.

DrThese propellers get their power from a dedicated source and most of these devices contain removable batteries so that it can stay in air for long run. The flight time can be extended with use of powerful batteries in design.

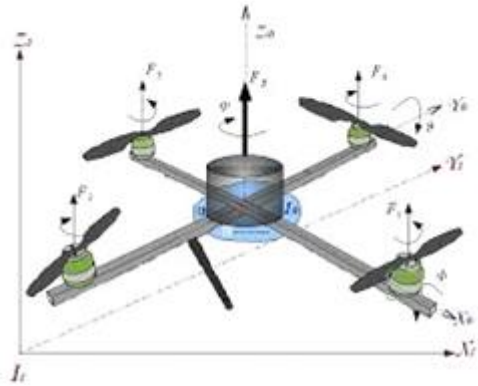


Figure 10. Drone Work

Controller plays an important role in drone flying mechanism. This device is used by experts for controlling every movement of drone, ranging from its launching, navigation abilities and even up to landing. Market is flooded with variety of controllers these days and developers often use to do various experiments to create drones with impressive features.one Work.

LI-PO Battery

The batteries that most popular for drones are the **Li-PO battery** or Lithium Polymer batteries. These rechargeable batteries have taken the RC word to the next level. All the RC planes, helicopters and drones. The following are the reasons why these batteries are best for drones.

1. They are compact and lightweight and can be made in any shape or size depending on the type of drone it is being designed for.
2. These batteries have high capacities i.e., they hold a large amount of energy in a small and compact package.
3. They are pretty good at maintaining a constant power output when discharging.
4. The rate of voltage drops when they reach a fully discharge rate is fast and can become damaging for the battery.

5. For powering the most demanding remote-controlled **aircrafts LIPO battery** have the highest discharge rates. Because they also have high charge rates, so charging in an hour is also possible.
6. These batteries have no memory effect compared to other versions like the NiCad or the Ni-Mh batteries

Electronic Speed Controller

Electronic Speed Controllers (ESCs) translate the signal to the electrical supply, controlling the rotational speed of the motor by adjusting electric current (Amp) to ensure the motors run smoothly and efficiently. With a drone, each motor has its own ESC, which connects directly to the flight controller.

FC Connection: Here is an example wiring diagram how components in a drone are connected to a flight controller.

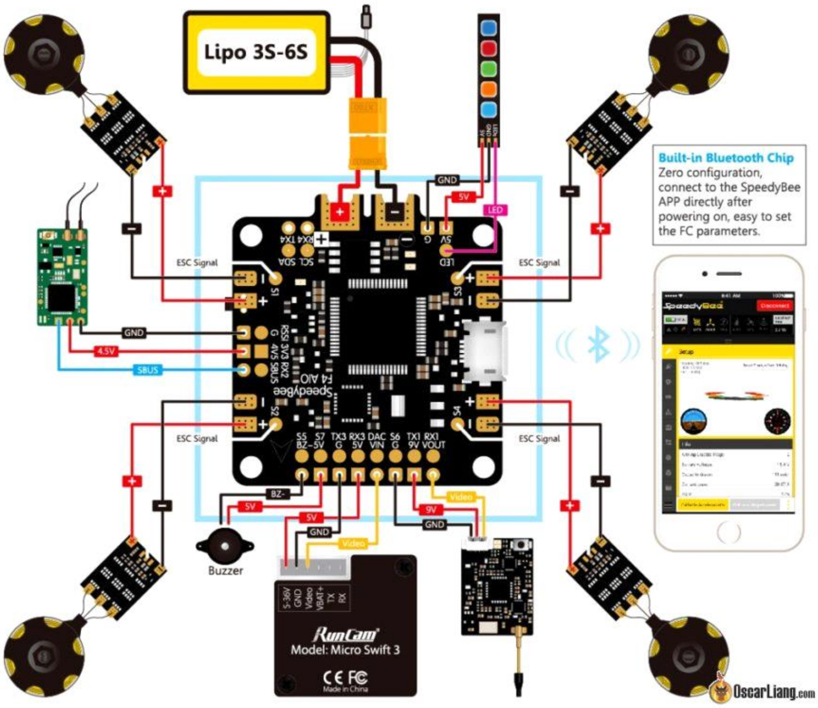


Figure 11: FC controller

Flight Controller Firmware

In addition to hardware options, there is also different firmware you can choose to run on your FC, which offer different features and specializations for various applications. For exampleiNav is designed with GPS utilization in mind, whereas KISS is more focused on racing and ease of use. Here is a list of popular available for mini quad. If you have no clue which one to choose, my recommendation would be Beta flight.

Processor

The processors in FC are also known as micro controller units (MCU), they are used to store the firmware codes and handling all the complex calculations. Currently, there are 5 main types of MCU used for FC's: F1, F3, F4, F7 and H7.
The main differences being the calculation speed and memory size:

Table.1

	F1	**F3**	**F4**	**F7**	**H7**
Speed	72MHz	72MHz	168MHz	216MHz	480MHz
Memory	128KB	256KB	1MB	1MB	128KB

We recommend getting either an F4 or F7 flight controller, because F1 and F3 are no longer supported in the latest versions of Beta flight due to the lack of storage for the expanding firmware.

Figure 12. FC Processors: from left to right: STM32 F1, F3, F4 UART in

Flight Controller

UART stands for **Universal Asynchronous Receiver/Transmitter**. ART is the hardware serial interface that allows you to connect external devices to the flight controller. For example, serial radio receivers, Telemetry, Race Transponder; VTX control etc.Each UART has two pins, TX for transmitting data and RX for receiving. Remember the **TX** on your peripheral connects to the **RX** on the FC, and vice versa. For example here are the UART3 (R3 and T3 pins) and UART6 (R6 and T6 pins) on a flight controller. You can assign these UART a task in the ports tab of **Beta flight configuration.**

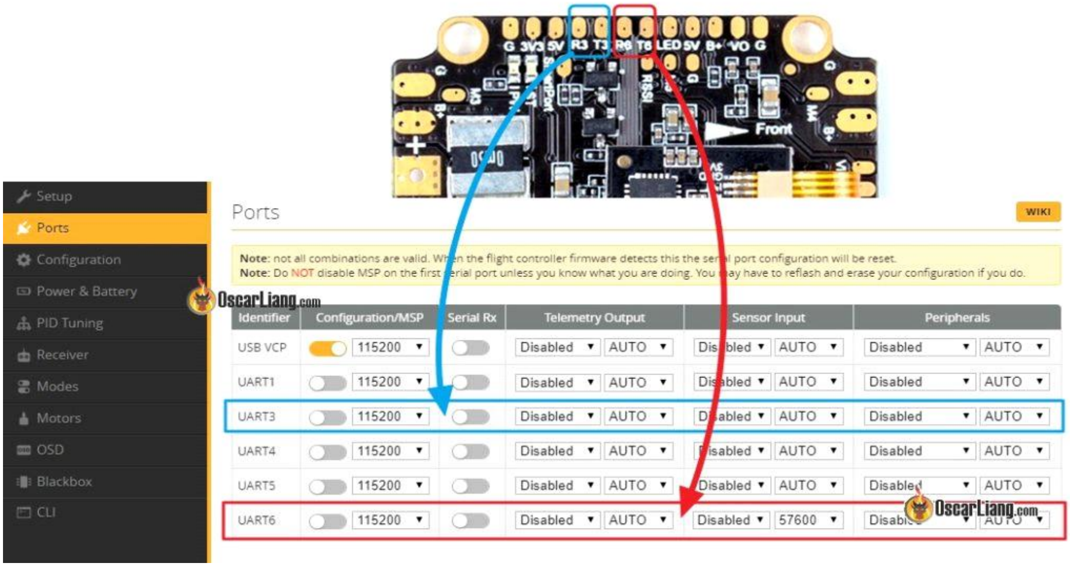


Figure 13. UART IN FC

UART’s on an FC

You might not need many UART’s, but having more is always handy.The number of UART’s available largely depends on design of the board, and the processor used. For example, F1 FC normally only has 2 UART’s, while F3 and F4 can have between 3 to 5 and F7 can have 6 to 7.

Table. 2

	F1	**F3**	**F4**	**F7**
No. of UART	2	3-5	3-6	6-7

ESC Work (Electronic Speed Controller)

An ESC or an Electronic Speed Controller controls the brushless motor movement or speed by activating the appropriate MOSFETs to create the rotating magnetic field so that the motor rotates. The higher the frequency or the quicker the ESC goes through the 6 intervals, the higher the speed of the motor will be.

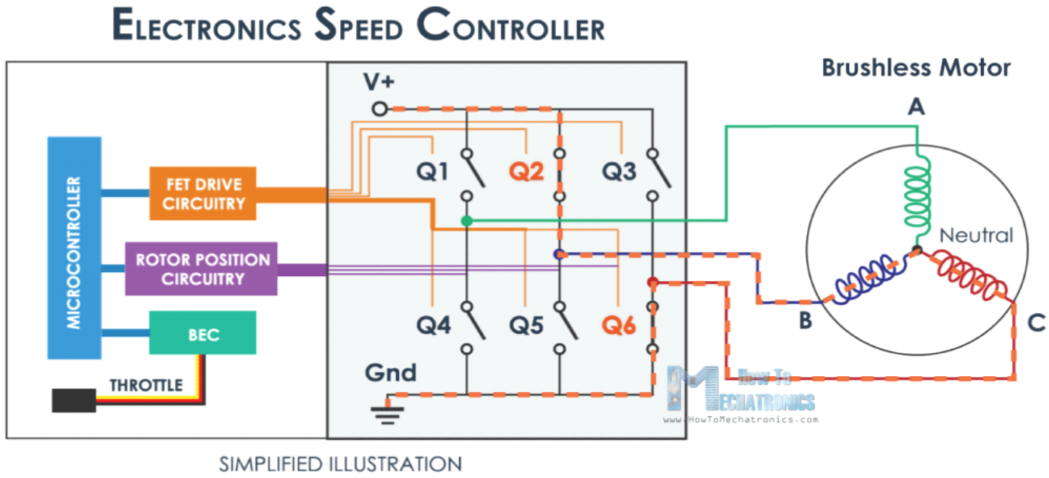


Figure 14.

Here comes an important question, and that's how do we know when to activate which phase. The answer is that we need to know the position of the rotor and there are two common methods used for determining the rotor position.The first common method is by using Hall Effect sensors embedded in the stator, arranged equally 120 or 60 degrees from each other.

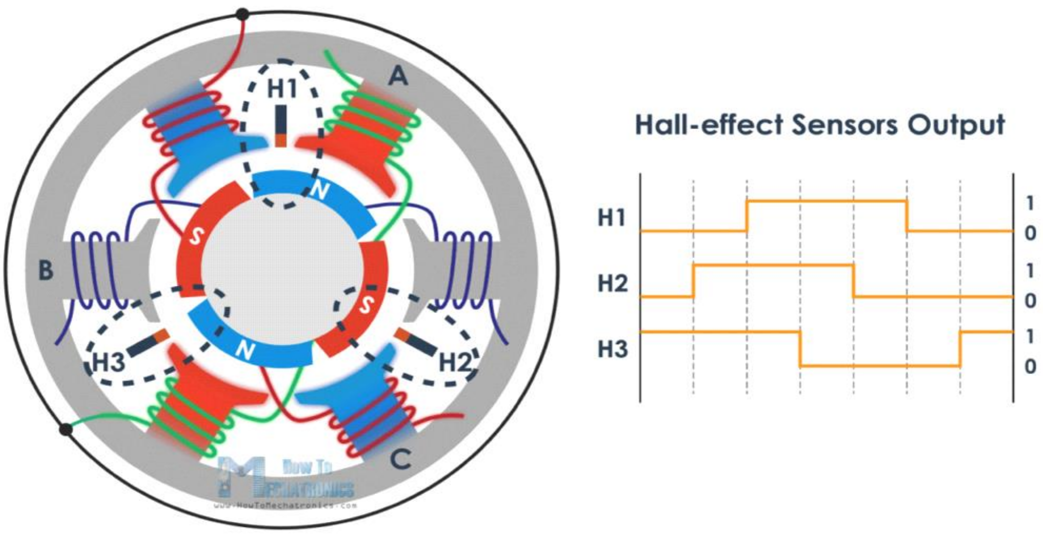


Figure 15.

As the rotors permanent magnets rotate the Hall-effect sensors sense the magnetic field and generate logic "high" for one magnetic pole or logic "low" for the opposite pole. According to this information the ESC knows when to activate the next commutation sequence or interval.

Camera module:
A camera module is an image sensor integrated with a lens, control electronics, and an interface like CSI, Ethernet or plain raw low-voltage differential has evolved over the years, and many of the services being offered today are far superior to those that were available just a few years ago. Much of this improvement is due to the advent of digital photography. However, no events have disrupted commercial photography to the extent that drones have.

Photography drones provide a unique perspective
Drones are able to open up angles that are not otherwise achievable. For instance, wedding photographers are often seen running around in an attempt to get the best angle. They typically take a series of both candid and posed shots. At such events, though, pictures taken by drones can add to the mix without compromising the budget.

Drones offer better sports angles
Taking can be challenging due to the fast pace of the game or event. However, using drones for photography can provide the views that most people want to see. This is especially true at outdoor sporting events, such as baseball games, soccer, and auto racing. In the past, sports photographs had to be taken from the stands or the edges of the field. Then along came Sky cam, a camera supported by cables that hover over the field.

Wildlife pictures taken by drones are less risky
In the past, taking wildlife photos carried a considerable amount of risk, and some photographers have died as a result of getting too close to wild animals. However, using drones for commercial photography has completely changed that game since wild animals can be approached without risk. Unlike humans, animals do not fear drones.

News reporting is more realistic with drones
Drone aerial photography series are changing the way we view the news. Instead of relying on prerecorded photos and videos, drones are streaming live images of such things like natural disasters, crimes, and political protests.
U-bloc NEO-6M GPS module:

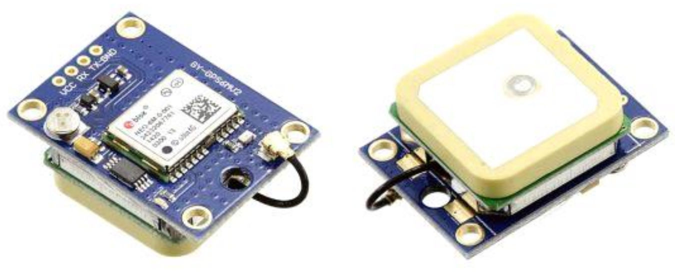


Figure 16. U-Blox

The u-blox NEO-6M GPS engine on these modules is quite a good one, and it also has high sensitivity for indoor applications. Furthermore, there's one MS621FE-compatible rechargeable battery for backup and EEPROM for storing configuration settings. The module works well with a DC input in the 3.3- to 5-V range (thanks to its built-in voltage regulator).

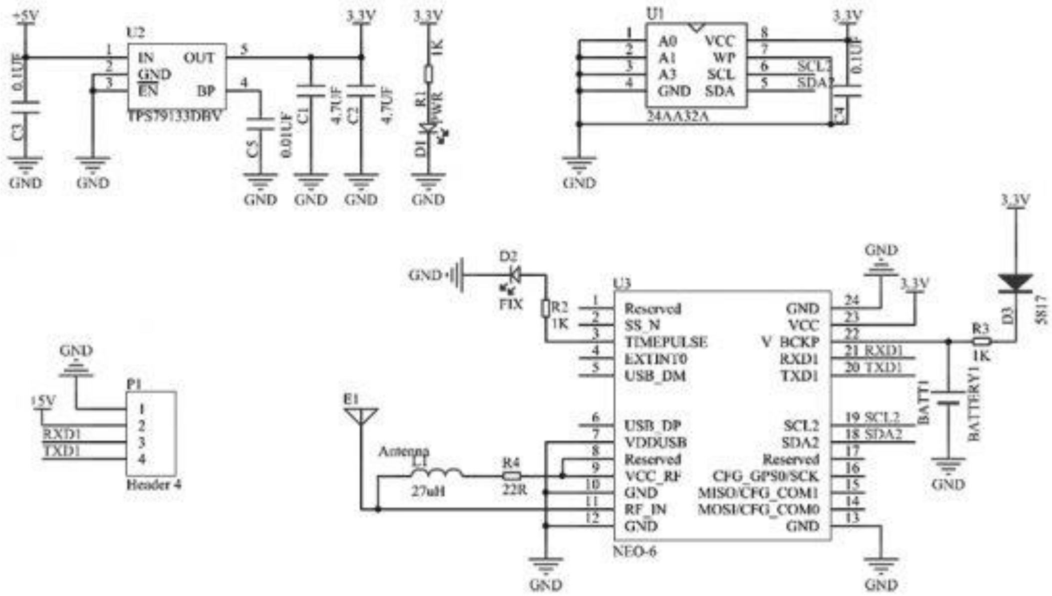
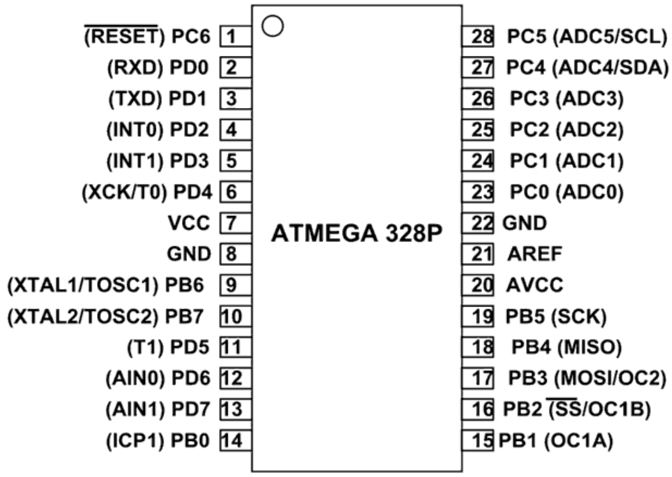


Figure 17. Circuit Diagram

As indicated, the GPS modules are based on the u-bloc NEO-6M GPS engine. The type number of the NEO-6M is NEO-6M-0-001, and its ROM/FLASH version is ROM 7.0.3 (PCN reference UBX-TN-11047-1). The NEO-6M module includes one configurable UART interface for serial communication, but the default UART (TTL) baud rate here is 9,600.

PCB Board: Printed circuit boards (PCBs) are the foundational building block of most modern electronic devices. Rigid, flexible and rigid flex PCBs are commonly employed in the aerospace industry for instrument panels, dashboards, flight controls, flight management and safety systems.



LED Light

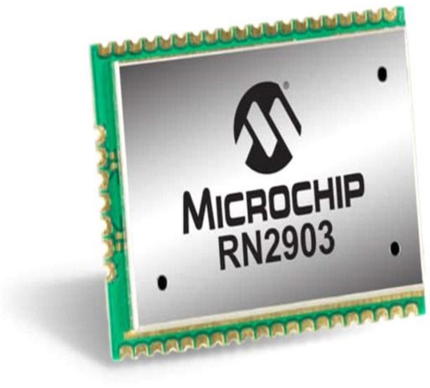
In this project, we will build few simple LED Circuits. Nowadays, people are investing more in LEDs due to their energy efficiency. Home lighting, office lighting, Automobile lighting, Street lighting etc. are all being implemented using LED.

Calculating Series Resistor

The value of the series resistor can be calculated using the following formula.
RSERIES = (VS – VLED) / ILED
Here, VS is the Source or Supply Voltage
VLED is the voltage drop across the LED and
ILED is the desired current through the LED.

In our simple LED Circuit consisting of a single LED, we have used a 5mm White LED and a power supply of 12V.
As per the datasheet of the 5mm White LED, the Forward Voltage of the LED is 3.6V and the Forward Current of the LED is 30mA.
Therefore, VS = 12V, VLED = 3.6V and ILED = 30mA. Substituting these values in the above equation, we can calculate the value of Series Resistance as
RSERIES = (12 – 3.6) / 0.03 = 280Ω. Since there won't be a 280Ω Resistor, we will use the next big resistor i.e. 330Ω. Hence, RSERIES = 330Ω.

Lora board: Lora technology was developed by a company called Semites and it is a new wireless protocol designed specifically for long-range, low-power communications. Lora stands for Long Range Radio and is mainly targeted for M2M and IoT networks.



LoRa™ Long-Range Sub-GHz Module
(Part # RN2903)

Speaker

Sky Speaker-I is a megaphone designed for SUAS, can be installed on multirotor and fixed wing platforms. Based on digital wireless transmission technology, it can play recorded sound sources and do real-time broadcasting. In this case, it will be very helpful in missions like rescue, search, fire fighting, police negotiation etc.

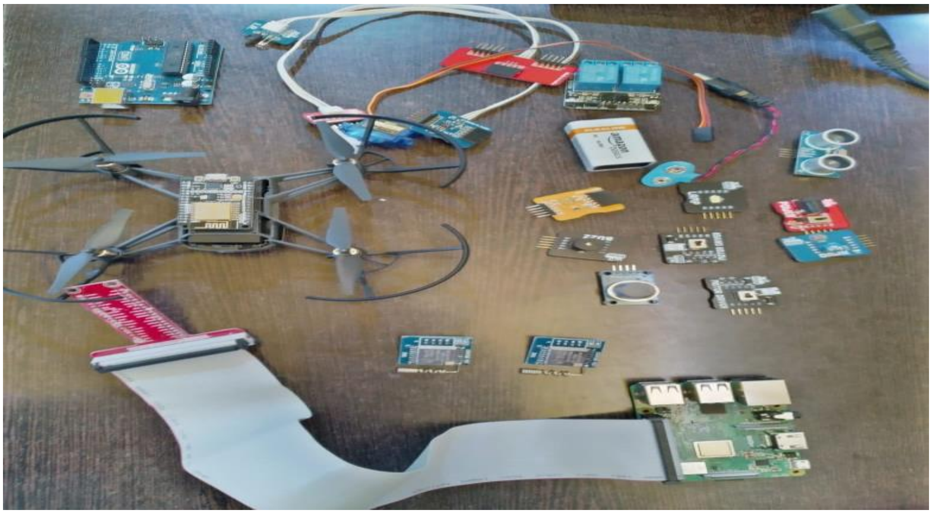


Fig 18. components of drone

Max AMP Rating:

Brushless ESCs are used to control brushless motors that are used on most quadcopters. The maximum amperage an ESC can handle needs to be greater than the motor/prop combination will draw. In terms of ESC, suggesting 20%-50% extra Amps is good rule to ensure your ESC do not burn out. ForexampleCurrent rating for motor is 22A so ESC you are considering 30A should do fine. Here is simple formula, ESC = 1.2-1.5 x max amp rating of motor. So, we can select ESC between ranges of 26A to 33A.

Voltage from battery:

Make sure your ESCs the ability towithstand the voltage from the chosen battery.
If you remember our motor draws max 15amp.So watt value for 3S and 4S will be
Since our motor is of max current 16 Amp and we can take the esc of 30A.
At 3S battery 11.1 x 15 = 166.5 Watt
At 4S battery 14.8 x 15 = 222 Watt
Due to reason or formulae
ESC (A) =1.2-1.5×MAX AMP OF MOTO
=1.5×16
=25.
SO, we have chosen the ESC of 30A.

Thrust calculation of drone:
General required thrust is given by an formula mentioned below it is
Thrust required = (total weight of setup) ×2/4.
Therefore, according to the frame, esc, battery and other set up we are getting a weight of 1300 grams. I.e. frame weight is 950 grams and other will roughly weights of 350 gram.
Required Thrust = 1300×2/4
= 1000/4
= 250gms

Here we get the required thrust for each motor should be 650 grams for each motor. Now we have to calculate the actual amount of thrust that is going to produce by an individual motor. According to some sources i have found that the thrust generated by motor is given by following formula

T= [(eta×P) ^{2}×2×pi×r^2×air density] ^⅓ Where,

Eta = prop hover efficiency

let us take it as 0.7-0.8

P= shaft power

= voltage ×current ×motor efficiency

R = radius of propellers in meters

Air density =1.22kg/m^3

Voltage = 10v

Current =16A

Motor efficiency =75%=0. 75

Eta=0.7

Then, thrust is

T= [(0. 7×10×16×0.75) ^{2}×2×3.14×0.127^2×1.22] ^0.33

= [(84) ^{2}×0.123] ^0.33

= (7056×0.123) ^0.33

= 871.92^0.33

= 9.348 N

Hence, the thrust generated by each motor = 943 grams

Since we have 4 motors in the quadcopter,

the total thrust generated by all motors is given by multiplying, thrust with 4

Total thrust T = 943×4 grams

= 3772 grams

T = 3.772kg.

If we again choose any less efficiency in motor then we will take some factor of safety, if they work only 70% efficient in the above 70% efficient work we can produce thrust of Thrust

T = 3.772×70/100

T = 2.64kg

Therefore, the min-to-min amount of thrust produced by all the motors is 2.64kg

Battery Calculations

We have to calculate the amount of energy it is consuming; hence we have now calculating the source required by the battery.

Max source

= discharge rate*capacity

= 20×2200

= 4400

= 44Amp

Propeler calculation for thrust:

Payload Capacity + The weight of the craft itself = Thrust * Hover Throttle %

For example, if you choose 3s Li-po battery to supply power. you propose is 10*4.7 and throttle is 75%. The weight of the craft itself is 1700g and we, want to build our quadcopter which can load 1000 grams.

1000+1700
= T×75% T
= 2700/0.75 T =3700

Specification of disinfectant spraying drone

S.NO	PARAMETERS	VALUE
1	UAV dimensions	15*15*6
2	Weight, gm	250
3	Programming	Python version 3.7.6
4	Number of nozzles	1
5	Speed	8M/s
6	Height coverage ,ft	100
7	Spray motor, gms	50

Result and Conclusion

COVID-19 is mainly transmitted via aerosol and droplets and inanimate surface can preserve the infectious surface can be preserve the infectious for days at room temperature. Information regarding corona virus transmissibility to hand by contaminated surface not identified yet. In the face of a shortage of particular antiviral remedy, it is profoundly to develop efficient methods of prevention and confirm that existing means are effective based on the field case. Thus, the suitable assessment for efficiency of the antiseptic disinfectant is a crucial matter. Bearing in mind these facts, an antiseptic- disinfection spraying UAV is developed compromising of automated drone and sprinkling system. The spraying system is connected to the lower area of the UAV that contain a nozzle under the antiseptic tank to spray the disinfectant in the downstream direction. The invention of the developed system gives notable significance especially in disinfect of largescale area with less human interaction to minimise the probability of virus spreading.

Antiseptic-disinfection spraying UAV is so far in its early phase and it is a scope for more advancement in the context of antiseptic technology. This preventive impact must be precautionary taken into account during development strategies of antiseptic-disinfection. In fact, this usually includes a larger amount and /or concentration of the antiseptic-disinfectant product and hence, a larger toxicity. Therefore, an effective disinfection operation must involve a pre-cleaning stage to remove these organic compounds. The early well-known fundamental of antiseptic-disinfection, which just sanitize objects effectively disinfected, is still noteworthy process. This initial experiment may serve as a model for other research looking to respond to the health crisis. Longer term, they can provide lessons for how private and public health system can integrate drone technology into their planning to lessen any upcoming pandemics.

Main model: The Model Which We Done For Our Project

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